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(54) Data transfer devices and methods

(57) In one aspect, the present invention provides a network of game machines (506, 508, 510, 514) including a central controller (500). The central controller is useable to receive data from the game machines and also to transmit data to the game machines, for example to upload new or corrected software to the game machines. Some of the game machines may be connected to the network via radio link (512). Higher baud rates, such as 10,000 baud, are acheivable with the network of the present invention.

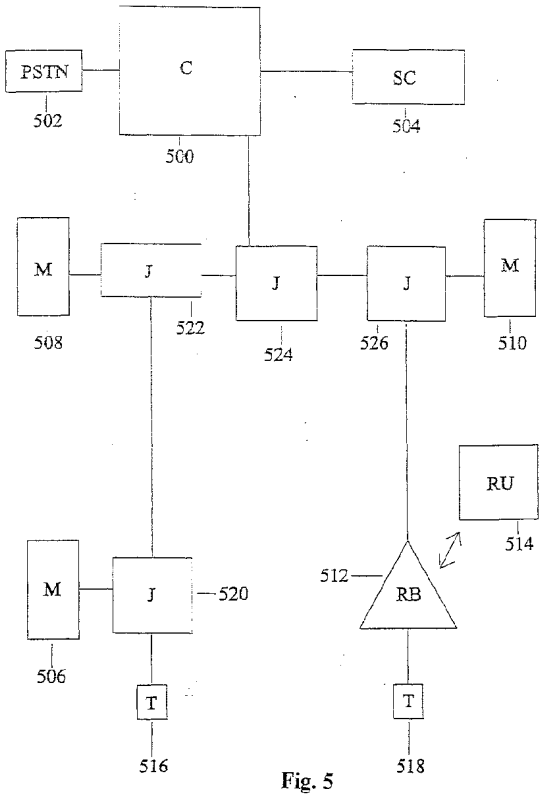

Fig. 5

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Description

[0001] The present invention relates to transferring data to or from a cash or token operated machine, or between a plurality of cash or token operated machines. Each cash or token operated machine may, for example, be a vending machine or a game machine, for example a game machine used for gambling. The invention further relates to a network of cash or token operated machines, and a method of transferring data within the network.

[0002] A single site, e.g. a public place such as a public house, amusement arcade or railway station, may be provided with many cash or token operated machines, such as vending machines or game machines. In this context the term "cash or token operated machine" is traditionally used to mean any machine which delivers goods or a service upon receiving a payment (e.g. by a coin, a banknote, or a token such as a pre-purchased token or a credit or debit card), but nowadays can also include machines for which 'payment' is made remotely e.g. at a bar in a pub, and the machine is then given appropriate 'credits' and also machines which may be operated wholly or periodically without payment. The term is used in this specification in this broader sense.

[0003] Nowadays many, though not all, cash or token operated machines include a data processing unit. For example, a modern game machine conventionally includes a CPU communicating with many information output devices (lights, sounders etc.) and input devices (e.g. push buttons) based on game software which it reads from a memory device. Each coin or token operated machine at a given site may be designed, installed, or maintained by a different supplier, yet it is desirable for them to be able to communicate with a central location, to allow control, security or accounting operations to be performed centrally.

[0004] For example, it is known to connect a plurality of machines to a coordinator ("server") at a central location, so that each machine can transmit signals to the central location. The signals may include alarm signals (e.g. to indicate that a machine is being interfered with), financial information about the money taken by the machine, or information about the usage of the machine, e.g. statistical information concerning the number of plays made. The latter type of information is useful to identify when a machine is not being frequently used, to determine that it should be updated or replaced.

[0005] This data would be useful also off-site, for example to a designer of game machines, and for this reason it is known for the server to transmit data out of the network by telephone. In practise, however, the expense of doing this means that only a selection of the data available to the server is transmitted.

[0006] Conventionally the data received by the server is accumulated for later analysis. For example, in a case that it is to be transmitted out of the server by telephone, it is accumulated during the day and transmitted at night to reduce costs. Thus, if there is a power failure at the central location, the accumulated data may be lost or corrupted.

[0007] A known interface which transmits data out of a game machine (to the server) is called a "datapak". It is connected to the main processor of the game machine and receives data from the main processor at a standard rate of up to 1200 baud. No higher transmission rate is possible, due to the low power of a typical game machine processor. This interface can transmit data either by a permanent electrical connection (e.g. a wire to the server), or to at intervals a recording medium connected to the game machine by an operator.

[0008] In fact, since the concept of transferring data via an interface into a game machine has not so far been realised, local parameters are actually input by inserting an extra physical unit into the game machine, such as an extra ROM memory device or a mechanical "key".

[0009] At this point we should distinguish between game machines which merely entertain the user by sound and visual stimuli (for example video racing games), and those which provide the user with a potential financial return (i.e. gambling machines). The latter type are here referred to as "gaming machines".

[0010] An example of a game machine which is not conventionally a gaming machine is a pool table (a term used here to include a snooker or billiards table or similar). Conventionally pool tables contain little or no electronic circuitry, even the coin receiving mechanism being mechanical, so pool machines are not integrated into a site-wide accountancy system.

[0011] A popular form of gaming machine (often called a "fruit machine") employs spinning reels which are at least partly visible to a user, and generates complex electronic control signals to operate sounders and lights.

[0012] In the complex software of game machines (especially gaming machines) it is inevitable that bugs of various kinds will occur, leading to unwanted behaviour of the game machine. Some such bugs will come to light as the designer tests the software on a PC which emulates the low power processor of a game machine. The designer may eradicate these bugs by interrogating the emulator in the PC to determine exactly what has gone wrong, i.e. exactly what state the emulated the processor was in when the unwanted behaviour of the game machine occurred.

[0013] However, other bugs only become evident after extensive actual use of the game machine. For example, in the case of gaming machines, some bugs only generate unwanted effects in the event that the gaming machine reaches a rare configuration.

[0014] Furthermore, if the unwanted behaviour occurs after the game machine has been commercially released, or even during pre-release testing of the game at a commercial site, the game may acquire a commercial reputation for unreliability. In this case, even if the bug is corrected, the reputation of the game is hard to

restore. For example, in the case of gaming machines, it is an unfortunate fact that many perfectly adequate gaming machines, which have been developed at great expense, are withdrawn from the market place and discarded simply because of an adverse commercial reputation caused by bug which has already been corrected.

[0015] Game software is frequently written so that it automatically produces run-time indicators of the usage and operation of the game machine, such as statistical information about how often a particular button is pushed or the values of (e.g. critical) registers at certain moments. These indicators are used when the game software is written, but once the software is installed in a real game machine it is hopeless to try to extract it using the interface since the volume of data is much greater than the capacity of the interface. Even if it were possible to transfer the indicator data out of the game machine into the network as mentioned above, it would not be practical to transmit it out of the network (e.g. to the writer of game machine software). For example, a given machine may generate 4Kbytes of indicator data every 10 minutes, and the network may contain 127 machines, so that each day more than 20Mbytes of data would be generated.

[0016] Apart from correcting bugs, there are other reasons why a game manufacturer modifies existing game software. One of these is when he releases an improved version of a game. In this case existing game machines are usually not supplied with the new game software; instead the new software is only provided in new game machines. One reason for this is the sheer technical difficulty of installing replacement memory chips in off-site (i.e. away from the manufacturer's base) game machines. Also, there are security issues involved in supplying memory chips containing proprietary software separately from game machines. Another reason for modifying software is to bring it into line with (e.g. new) legal requirements.

[0017] Security is of great importance in the installation of any cash or token operated machine, since there is a great potential (dishonest) profit available to an operative who succeeds in installing a machine incorrectly. Furthermore, an inadvertent installation error (operatives are not always highly skilled) may also lead to a loss by the operator of the machines. There is therefore a general need to control installation of machines to make it more secure and reliable, and to improve the accountability of operatives.

[0018] The present invention seeks to provide a new and useful game machine, and especially (though not exclusively) a game machine which is a gaming machine.

[0019] The invention further seeks to provide new and useful methods and devices for transferring data to and/or from a game machine or a cash or token operated machine.

[0020] The concept of transmitting game software to a game machine constitutes an independent aspect of the invention, which is a game machine including:

payment receiving means;
a writeable memory;
a processor for processing game software stored in the memory; and
an interface for receiving game software from outside the game machine, and writing it to the memory.

[0021] An operator may be able to program (usually re-program) the game machine, for example updating some or all of the game software to modify the game (e.g. to correct bugs, or to improve the pleasure of the game). For example, the game operator may be able to provide data to keep the game topical (e.g. with references to contemporary world events, personalities or other news), or with updated quiz questions.

[0022] If the manufacturer devises an improvement to the game software in the game machine (e.g. corrects a bug in the game software) he or she may be able to implement that improvement (e.g. correct the bug) by transmitting to the game machine through the interface replacement game software which includes the improvement (e.g. a debugged portion of the game software).

[0023] Within the scope of this aspect of the invention, a game machine which is a part of a network may be able to input the game software which it is to process from a central location (e.g. server)in the network, e.g. according to an instruction generated at the central location. This gives the operator of the network great flexibility, in determining which of a plurality of game machines is used to play which of a plurality of games stored at the cental location. The game manufacturer may be able to update the game software at the central location, for subsequent transmission to game machines.

[0024] Indeed, it is possible for new game software to be transmitted (e.g. from the central location of a network) whenever the game is used. That is, a plurality of games may be stored in a central location in communication with the central location, and an operator or the user may select one game which is then transferred to the machine for the user to play.

[0025] In a further aspect, the present invention provides a method of reprogramming a game machine according to this aspect of the invention by transmitting game software to the game machine.

[0026] In an aspect the invention proposes a game machine, having a data interface for transferring data into and/or out of the game machine or cash or token operated machine.

[0027] Preferably the interface permits a data transfer rate which is e.g. at least 10,000 baud, at least 100,000 baud, or at least, 1,000,000 baud. Preferably the baud rate is not over 10,000,000

[0028] Preferably, the interface transmits information both into and out of the machine.

[0029] In the case that the interface transmits information out of the machine, the interface preferably transmits indicators characterizing the operation of the game software. The indicators may include any one or more of (i) data characterizing when the machine is used, (ii) data (e.g. statistical data) on the timings at which the user inserts money or operates information input devices (e.g. buttons), (iii) the state of the display and/or sound generated by the machine at times when the user inserts money or operates information input devices, (iv) financial information concerning the cash or tokens received by the machine, and (v) data concerning the internal running of the game software (e.g. values stored in particular registers).

[0030] Preferably, enough information is transmitted out of the interface to reconstruct the play of the game. For example, at least enough information may be transmitted to reconstruct the display generated to a user of the machine and his reactions to that display. More preferably, the transmitted data allows identification of bugs in the software or other portions of the software which should be improved.

[0031] The information may be transmitted in real time (as the game is played) or stored in the memory and transmitted in bursts, e.g. with a predetermined timing (e.g. periodically) or in response to a triggering signal received from outside of the machine, e.g. through the interface.

[0032] The possibility of transmitting large amounts of data into a game machine or cash or token operated machine makes it possible to conceive of a possibility not envisaged in the literature, of transmitting not just parameters into the game machine but actually applications (that is game software consisting of instructions).

[0033] As a separate independent aspect of the invention, the interface may include data storage means e.g. memory. The data storage means may also have a battery backup power supply or other suitable power means in order to retain data in the data storage means in the event of a mains power failure. In this way data relating to, for example, the operation of the interface e. g. the protocols to be used, can be stored and updated as necessary.

[0034] Further independent aspects of the invention relate to using radio communication to transfer data into and/or out of a cash or token operated machine (especially a game machine), or between networks of cash or token operated machines. In some embodiments radio communication gives the advantage of secrecy, while in some embodiments it gives the advantage that one or more game machines can be easily integrated into a network (e.g. on a single site). In some embodiments, the radio communication device is a mobile telephone which can exchange data with a conventional mobile telephone network.

[0035] Specifically, in a third aspect, the invention provides (e.g. a cash or token operated) game machine including:

payment receiving means;

means for analysing usage of the game machine to generate usage data; and

a radio communication device for transmitting signals carrying said usage data out of the machine.

[0036] In a first embodiment, the data may be transmitted to a radio receiver on the same site, so that the game machine can be integrated with the data collection at that site. That is, one or more machines according to the third aspect of the invention may compose part of a system which includes a collating device (server) which receives radio signals from the machines and collates them.

[0037] For example, the game machine may be a pool table, such as a pool table which is not controlled by a processor. However, even though the game machine is not controlled by a processor, the means for analysing the usage of the game machine may include device(s) to monitor the usage of the game machine (e.g. a measuring device, such as an optoelectronic device, to measure when coins are inserted into a mechanical coin receiving device (so that the total take of the machine can be transmitted out of the machine), or to indicate the fall of the final ball of the game). The game machine may include a processor to analyse the usage data before it is transmitted out of the game machine.

[0038] This aspect of the invention can be particularly useful for game machines (e.g. a pool table) which are not powered by mains electricity or, even if they are capable of being powered by mains electricity, are situation in a location to which it is inconvenient to supply mains power. For such machines, in the absence of mains power it may be difficult to operate data transfer apparatus in accordance with other aspects of the invention. Often it will be more convenient to transfer data using a radio communication device in accordance with this aspect of the invention.

[0039] In a second embodiment, the data may be transmitted off-site, for example to a manufacturer of game machines.

[0040] Preferably, as in the first aspect of the invention, the game machine of the third embodiment includes a processor running game software.

[0041] In either embodiment, the communication device may just emit a certain signal once whenever the game software is run. Thus, an operator (on site or off site) can count how often the game is played by counting the emitted signals. Alternatively, the game machine might include means for storing information on how often the game is played and the communication device may transmit this stored information, for example periodically or in response to an interrogation signal (e.g. received by the radio device).

[0042] Alternatively or additionally, the data may be

data (indicators) concerning the state of the game. For example, the data may be sufficient that an operator can use the signals to follow the play of the game from a remote location. A further possibility is that the data may describe any problems which have arisen during play (e.g. due to software bugs), and the configuration (internal state) of the game machine at that time, so that the receiver of the data can attempt to deduce the reason for the problem. In any of these cases, the receiver of the data may monitor features of the play, even if the game machine is located out of the premises of the manufacturer, for example during commercial testing of the game machine, or even once the game machine has been commercially released.

[0043] In fact, a fourth independent aspect of the present invention is a method of monitoring a game machine according to the third aspect of the invention, by receiving and analysing signals transmitted from it.

[0044] The communication device of the machine of the third aspect may also be capable of receiving radio signals. These signals may be signals to control the game machine. For example, the signal may be a signal activating the game machine (e.g. transmitted to the game machine to turn it on), or a signal which enables the game machine to indicate that the user has paid to use it. In this case the payment receiving means may just be a register recording that the enablement signal has been transmitted.

[0045] In a further example, the game apparatus may be arranged to run one of a number of games according to a signal received by the game machine via an interface.

[0046] Alternatively, and preferably, the signals include game software, for example as described above. This may, for example, be done even without the knowledge of the keeper of the game machine. Thus, de-bugging is possible without even making public the existence of the bug.

[0047] The third aspect of the invention has been explained above in relation to transferring data by radio to or from a single game machine. However, alternatively there may be a plurality of game machines, arranged into one or more networks of electrically connected machines. Each network may optionally also include other components, such as other cash or token operated machines or data collators and storage devices. The one or more networks may transfer data off-site or between themselves by radio. In the latter case this means that even physically separated networks at a single site (e.g. on different storeys of the same building) can be coordinated.

[0048] Specifically, in a fifth aspect the invention may provide a network of game machines (e.g. cash or token operated machines), each including:

payment receiving means; and

means for analysing usage of the machine to generate usage data;

said machines being arranged in one or more groups of electrically connected groups, each group being provided with a radio communication device for receiving and/or transmitting signals carrying said usage data (e.g. off-site or to another of the groups).

[0049] Sixth, seventh and eighth aspects of the invention relate to transferring data into or out of a game machine or a network of game machines by providing them with an interface for communicating with a physical recording medium. In the case of the sixth and seventh aspects of the invention, the data is input to the game machine or network of game machines to configure the machine(s). Preferably, the data is accompanied by data identifying the operator (the holder of the recording medium).

[0050] Specifically, in a sixth aspect, the invention proposes that a (e.g. cash or token operated machine) game machine having payment receiving means includes a reader interface for reading data from a physical recording medium, the data including configuration data for determining operation of the machine.

[0051] Preferably, the recording medium is a smart card, and the reader interface is a smart card reader device for reading data from the smart card.

[0052] By means of the invention, an operative can install a new game machine by supplying it and then allowing it to read configuration data from the recording medium to configure it. Since the data is read from a recording medium, the installation is relatively simple compared to inserting extra mechanical components into the machine.

[0053] Furthermore, the recording medium (smart card) preferably includes identification data identifying the holder of the recording medium. The game machine may store this identification data, so that in the future it is possible to determine which operative set up the machine. Alternatively or additionally, if the game machine is part of a network of game machines, it may communicate the identification data out of the game machine into the network, so that (e.g. at a central location) the identity of the operative may be checked and optionally recorded. Since the operative must supply the identification data in order to complete the set-up of the game machine, the system is open to less abuse than the conventional system described above. Furthermore, the identification data can be used to check that the correct recording medium (smart card) is being used, thus reducing the chance of an error being made in set-up.

[0054] In a further aspect, the invention proposes a network of game machines, each machine having payment receiving means and being electrically connected to at least one coordinating device (e.g. at a central location of the site), the coordinating device including a reader interface for reading data from a physical recording medium, the data including configuration data for determining operation of the network.

[0055] The recording medium read by the coordinating device may carry the local information about the site,

for example the price per unit of the game. The coordinating unit may transfer this data to the machine(s), for example when the machine is first installed or when the machine is first turned on. Thus, the recording medium read by the coordinating device may function as a key for the control of the entire network.

[0056] Preferably the recording medium read by the coordinating device contains identification data, so that it can be checked that it is the correct recording medium for that network. This makes it more difficult to incorrectly configure the network by using the recording medium of another site.

[0057] Preferably, the sixth and seventh aspects of the invention are combined, so that both a coordinating device (server) of a network has an interface for reading from the first recording medium, and at least one cash or token operated game machine includes an interface for reading data from a (e.g. respective) second recording medium. The installation of a new game device can then involve a coordinated process in which the operative inserts a second recording medium into the game machine(s), which transmits information to the coordinating device, to identify the type of game machine which has been inserted. The coordinating device reads local information from the first recording medium, and transmits it back to the game machine to configure it to operate according to the local standards.

[0058] The eighth and ninth aspects of the invention each relate to methods of handling reliably and economically within a network a high volume of generated data, such as the volume of data which can be generated by one or more game machines according to the first aspect of the invention.

[0059] In an eighth aspect, the present invention proposes a network of:

> one or more game machines, each machine generating data characterising the operation of the machine;
> at least one collating device receiving said data from the machines and including a data storage device, the collating device further including a writer interface for transferring the data to a recording medium.

[0060] The present invention makes it possible to transfer large amounts of data economically out of a network by incrementally, e.g. periodically, transferring it to a recording medium. Thus it makes possible for example economical transmission out of the network of the volume of indicator data which one or more game machines according to the first aspect of the invention can transmit into the network, and which may then optionally be sent to a producer of game software.

[0061] In other words, in the eighth aspect of the invention the machines are preferably game machines according to the first aspect of the invention. That is, in contrast to a conventional game machine which transmits such a small amount of data into a network that telecommunications may be adequate to transmit the data out of the network, even if the game machines in the eight aspect of the invention are capable of transmitting a high level of data into the network (e.g. a game machine according to the first aspect of the invention) a network according to the eighth aspect of the invention is capable of transmitting it out.

[0062] In a ninth aspect, the present invention proposes a network of:

> one or more game machines, each machine including a writable memory device and each machine generating data characterising the operation of the machine;
> at least one collating device in two-way communication with the machines and including a writable memory device, the collating device receiving said data from the machines, writing data to its memory device, and re-transmitting data to the machines to store it in the respective memory devices of at least one (preferably more than one) of the machines, whereby if there is a power failure to one of the machines or to the collating device the data is not lost.

[0063] Preferably, the collating device also processes the data, and it is the processed data which it stores in its own memory device and stores in the respective memory devices of at least one of the machines.

[0064] Alternatively, instead of or in addition to the network including the collating device (and the data storage device associated with the collating device), one or more of the machines may each include data storage means (e.g. memory) for storing the type of data which would otherwise be transmitted on the network. In effect the data storage means can act as a buffer to store data relating to certain events or a certain time period, for example for later or periodic transmission over the network.

[0065] The feature of the data storage means is also particularly advantageous where some or all of the machines each include an external data port via which data can be accessed other than over the network.

[0066] In practical embodiments, this may be used for manual collection of the data e.g. at periodic intervals. For example, someone could connect to the data port a data collection device e.g. a hand-held unit and go to each machine in turn collecting the appropriate data. The data thus stored by the hand-held unit can then be processed remotely. In some embodiments, the data collection unit may also write data to the data storage means, for example, the date and time at which the data is collected. The internal clock of the data collection means may of course not be consistent with the clock of the network and so it could cause problems if these two clock times were confused. Accordingly, the data storage means preferably records the clock time of the hand-held storage device and compares it to the current

clock time according to a network.

[0067] A further aspect of the present invention relates to the architecture and/or topology of the network used to link the machines. More particularly, the network includes a plurality of machines and each machines is linked to at least one other machine. Preferably only one of the machines (or one point on the portion of the network connecting the machines to each other) is in turn also connected to a controller e.g. a server. The server may be connected e.g. via a PSTN, ADSL or ISDN link to an external network. As described previously, the server may then be used to read and/or write data to each or all of the machines. This topology enables improved data communication as compared to the prior art topology.

[0068] As mentioned previously, one or more of the machines in the network may in fact be substituted by radio communication means for radio communication with equipment not directly included in the network. Preferably the machines of the network are connected in a line i.e. each of the machines is connected to only two other machines with the exception of the two machines one at each end of the network which are of course connected to only one machine. Preferably the or each end of the network is terminated in a suitable impedance. Preferably each machine receives all of the data being transmitted on the network. In a separate embodiment the machines may be connected in a loop i.e. each machine is connected to only two other machines.

[0069] As a separate aspect, one or more of the machines in a network may each include backup power supply means e.g. one or more batteries. The purpose of such a backup power supply is of course to enable some or all of the machine to continue to be able to function in the event of a mains power supply failure. Preferably the network controller includes power management means for managing the power consumption of a machine connected to the network in the event that the machine is disconnected from mains power. Preferably in the event of such a disconnection, the machine affected sends a suitable notification signal to the controller. The controller may then instruct the machine to terminate certain functions whilst maintaining other functions in order to conserve power consumption. Typically, the functions which will be maintained will be those relating to monitoring the security of the machine e.g. a tamper alarm etc.

[0070] The term "payment receiving means" is used throughout this document to include a coin receiving device (e.g. having a coin authenticating function), a banknote receiving device, a token receiving device which receives a pre-purchased token representing money or a credit or debit card (which is here regarded as a kind of token). In fact, it includes any device by which the user can pay to use the machine, or by which a signal is transmitted to the machine (e.g. through a network) to indicate that the user has paid to use the machine.

[0071] Preferably the game machine of the invention is a gaming machine, and includes payment dispensing means, such as coin dispensers, token dispensers, or means for transmitting a signal to an external device which acts on the signals to make a payment to the user. The game machine preferably includes information output devices (lights, sounders, spinning reels, etc), and information input devices (buttons, arms, pedals, etc).

[0072] It will be appreciated that while the above aspects have been explained in relation to game machines, preferably each or all are also applicable more generally to coin or token operated machines.

[0073] Any of the above aspects of the invention may be used in conjunction with any or all of the other aspects.

[0074] Embodiments of the invention will now be described, for the sake of example only, by reference to the accompanying figures, in which:

Fig. 1 shows schematically a first game machine according to the invention;
Fig. 2 shows schematically a network of cash or token operated machines;
Fig. 3 shows a second game machine according to the invention.
Fig. 4 shows a prior art network;
Fig. 5 shows a second embodiment of a network of the machines according to the present invention.

[0075] A first embodiment of a game machine 1 according to the invention is shown schematically in Fig. 1. It includes a coordinator unit (gate) 3 which coordinates transfer of data between a memory device 5 and a processor 7 (which may in fact consist of several physically separate processing units). The memory 5 includes at least a component of writeable memory.

[0076] The processor may for example be a Hitachi 32bit microprocessor from the family known as Super "H". The gate 3 may be a custom gate array. This gate is also able to provide a high speed multi element interchange interface for external I/O devices. The interface runs at 571KHz and can fully service all external resources in 128uS. The main system processor 7 has no connection with this process, all transfers are performed by the ASIC and data is read or written directly to/from the main battery backed static RAMs.

[0077] The game machine also includes a payment receiving device 9 (e.g. a coin receiver), and output devices such as sounders and lights (not shown). These may all be controlled by the processor 7, for example via the coordinator unit 3.

[0078] The game machine further includes a smart card reader 15, which can read data from a smart card inserted into it. The smart card data includes set-up data, for example setting a first configuration of the game machine, and/or portions of game software. The smart card data further includes identification data identifying the holder of the smart card.

[0079] The game machine further includes an inter-

face 17 for interfacing the game machine with leads 19 which connect the game machine to a coordinating/collating device ("server") 21 (described below in relation to Fig. 2).

[0080] The coordinator device can read data (e.g. game software) from the network through electrical leads 19 and transfer it into the memory 5 without interaction by the processor 7 (e.g. on a time scale which is independent of the clock speed of the processor 7).

[0081] On receiving data from a smart card using the reader 15, the game machine can exchange data via the interface 17 with the rest of the network, for example to send information to the coordinating device 21 to identify the game machine. In particular, the identification data on the smart card may be stored within the memory device 5 and/or in the data storage device which is part of the coordinating device 21.

[0082] The game machine further includes a radio receiver and transmitter, including an aerial 11 and signal processing device 13.

[0083] The coordinator 3 may transmit data (e.g. statistical data) out of the game machine using radio signals transmitted by the aerial 11. It may receive data via radio signals received by the aerial 11. These radio signals may include control instructions (e.g. when the game machine is turned on or off) and/or game software. The coordinator 3 can transmit the game software into the writeable portion of the memory 5.

[0084] The aerial 11 and processor 13 may, in fact, be technologically compatible with a mobile telephone network. Thus, an operator of the game machine may be able to transmit or receive radio signals using a conventional mobile telephone network, for example by dialling a telephone number associated with the game machine. Similarly, the radio apparatus 11,13 may be able to dial up the game machine operator by transmitting a dialling request to a conventional mobile telephone network.

[0085] Turning to Fig. 2, a network of coin operated machines is shown, including a plurality of game machines 1 illustrated in Fig. 2. The network further includes an aerial 23 and corresponding signal processor 25 for receiving data transmitted from an on-site game machine which is not in electrical contact with the network (as described below in relation to Fig. 3), and a cash or token operated machine 27 which is not a game machine. In the figure, the various machines are shown connected to the coordinating device 21 by a single cable 19 arranged along a closed path, but there may in fact be many cables arranged in other formations (see for example Fig. 5).

[0086] The coordinating device 21 includes a processor 22 a data storage device 29, a smart card reader 31, a connection to a telephone line 33 and an aerial 35.

[0087] The coordinating unit 21 receives various data from the game machines 1 via the cables 19. For example, it may receive set-up data transmitted by the game machines from the smart card operator. At the same time, the coordinating device 21 may receive data identifying the game machine 1, for example data characterizing its requirements. Also, at this time the coordinating device 21 receives via the cables 19 from the game machine(s) identification data from a smart card read by the game machine. The coordinating unit 21 may store this identification data in a storage device 29, or alternatively transmit it (e.g. by telephone line 33), to the supplier of game machines for example.

[0088] A smart card stored on-site can be read by the reader 31 to insert a local information into the network. The coordinating device 21 may transmit this local information via the cables 19 to machines 1, 27, 40.

[0089] Information may be sent out of the network, e. g. to an adjacent network of equivalent form, using optional radio aerial 35.

[0090] When it is decided to update the software in the game machines, this can be done by a telephone signal transmitted by the supplier of games software along telephone cable 33 to the coordinating device 21, which re-transmits it along cable 19 to the game machine 1, where the game software is transferred through interface 17 and coordinator unit 3 to the memory 5.

[0091] In use, the game machines 1 generate large volumes of data (e.g. at least tens of Kbytes), and this is transmitted (e.g. after a temporary storage in the memory device 5) via the interface 17 to the network through cable 19, so that it is received by the coordinating device 21, optionally collated (e.g. formatted and analysed), and stored in the storage device 29. Accumulated data may be transferred using a data writing device 37 to a recording medium such as a diskette or zip disk, so that the recording medium can be transferred to the writer of games software to enable improvements to be made. Although as shown above, the smart card reader 31 and the writer 37 are separate units, it is alternatively possible to form them as a single unit which both reads from and writes to a recording medium.

[0092] The coordinating device (e.g. periodically) backs up the data stored in the storage device 2a by copying it to at least one of the game machines 1 to be written into the memory 5. Thus, even if the memory devices 29,5 are volatile the redundancy of storage means that the network as a whole is less vulnerable to loss of power (or other influences) at one or more points in the network. Optionally, the storage device 29 can be omitted and the system can rely entirely on the memory devices 5 of the game machines 1.

[0093] The game machine shown in Fig. 3 is a machine such as a pool table in which the game is not controlled (or only to a limited extent) by a processor. A measuring device 110 (e.g. an optical switch for counting coin input) is provided for obtaining measurements about the insertion of money into a payment receiving device (not' shown) or for measuring characteristics of the play. The measuring device 110 transfers data to a processor 117 which processes it, and transmits it to a signal processor 113 for generating a radio signal to be transmitted from the game machine using aerial 111.

The signal transmitted from aerial 111 is received by the aerial 23 of the network (shown on Fig. 2), decoded by the unit 25 and transmitted to the coordinating unit 21. Thus, the coordinating unit 21 is able to derive information (e.g. financial information) from the game machine 40 without a wire connection existing between the game machine 40 and the coordinating unit 21.

[0094] Fig. 4 shows a prior art network used to connect four gaming machines 400. Each of the gaming machines 400 is connected directly to a server 402 which in turn may be connected to a telephone line for transmission of data out of the network. Such a network typically had a maximum transmission rate of 1200 board.

[0095] By way of contrast, Fig. 5 shows a second embodiment of a network according to an aspect of the present invention. A central controller or server 500 is connected or connectable to an external network 502 (for example a PSTN or ISDN link). The server 500 also includes a smart card device 504 for reading or writing data to a suitable smart card.

[0096] Three game machines 506, 508 and 510 are connected to the network and thereby indirectly connected to the controller 500. As will be seen, machine 508 is effectively connected to both machines 506 and 510. Machine 506 is effectively at one end of the network and is therefore connected only to machine 508. Machine 510 is connected to machine 508 and a RF base station 512 which can be considered to take the place of a further fourth machine. Base station 512 is effectively at the other end of the network and is therefore only connected to machine 510.

[0097] Associated with RF base station 512 is an RF unit 514 which may be located in a further machine, possibly one which does not have ready access to mains power for example a pool table. Effectively therefore the pool table or other remote machine is incorporated into the network via an RF link between the base station 512 and the unit 514.

[0098] As will be seen from Fig. 5, the network can be considered to be in a "horseshoe" arrangement and the respective ends of the network are terminated by impedance terminations 516, 518. The impedance of terminations 516, 518 may be selected or adjusted so as to minimise reflections in the network.

[0099] In fact, as will be seen in Fig. 5, the machines 506, 508, 510 and RF base station 512 are not connected directly to each other by single cable runs but instead are interconnected via a series of junction boxes 520, 522, 524 and 526. Machines 506, 508 and 510 are associated with junction boxes 520, 522 and 526 respectively, whilst commander 500 is connected to the remainder of the network via junction box 524.

[0100] The embodiments above have been given for the sake of example only, and various modifications are possible within the scope of the invention.

Claims

1. A game machine including:

   payment receiving means;
   a writeable memory;
   a processor for processing game software stored in the memory; and
   an interface for receiving game software from outside the game machine, and writing it to the memory.

2. A network including a plurality of game machines according to claim 1 and a server for transferring the game software to the game machines.

3. A network according to claim 2 wherein the server is provided with a plurality of games selected ones of which are transferrable to selected machines for the users to play.

4. A cash or token operated game machine, having a data interface for transferring data into and/or out of the machine at a data rate of at least 10,000 baud.

5. A machine according to claim 4 wherein the interface is usable to transmit indicators characterizing the operation of the game software including any one or more of (i) data characterising when the machine is used, (ii) data on the timings at which the user inserts money or operates information input devices, (iii) the state of the display and/or sound generated by the machine at times when the user inserts money or operates information input devices, (iv) financial information concerning the cash or tokens received by the machine, and (v) data concerning the internal running of the game software.

6. A machine according to claim 4 wherein the interface is usable to transmit enough information to reconstruct a play of the game.

7. A machine according to claim 5 or claim 6 wherein the information is transmittable in real time (as the game is played) or is stored in a memory and transmitted periodically or in response to a triggering signal received from outside of the machine.

8. A machine according to any one of claims 4 to 7 wherein the interface includes data storage means and a backup power supply means in order to retain data in the data storage means in the event of a mains power failure.

9. A cash or token operated or game machine including:

   payment receiving means;

means for analysing usage of the machine to generate usage data; and
a radio communication device for transmitting signals carrying said usage data out of the machine.

10. A machine according to claim 9 which is not powered by mains electricity.

11. A machine according to claim 9 or 10 including means for storing information relating to operation of the machine and wherein the communication device is usable to transmit this stored information periodically or in response to an interrogation signal.

12. A machine according to claims 9 to 11 wherein the communication device is also capable of receiving radio signals.

13. A network including a machine according to any of claims 8 to 11 and a radio receiver and/or transmitter for receipt and/or transmission of radio signals to/from the machine.

14. A cash or token operated machine or game machine including a reader interface for reading data from a physical recording medium, the data including configuration data for determining operation of the machine.

15. A machine according to claim 14 wherein the recording medium is a smart card, and the reader interface is a smart card reader device for reading data from the smart card.

16. A machine according to claim 14 or 15 wherein the recording medium includes identification data identifying the holder of the recording medium.

17. A network including a plurality of cash or token operated machines being electrically connected to at least one coordinating device, the co-ordinating device including a reader interface for reading data from a physical recording medium, the data including configuration data.

18. A network including one or more cash or token operated machines, each machine including:

means for generating data characterising the operation of the machine;
at least one collating device receiving said data from the machines and including a data storage device, the collating device further including a writer interface for transferring the data to a recording medium.

19. A network according to claim 18 wherein each machine includes a writeable memory device and the collating device is in two-way communication with the machines and includes a writeable memory device, the collating device including means for receiving said data from the machines and writing data to its memory device, and means for re-transmitting data to the machines to store it in the respective memory devices of at least one of the machines, whereby if there is a power failure to one of the machines or to the collating device the data is not lost.

20. A network according to claim 18 or 19 wherein some or all of the machines each include an external data port via which data can be accessed other than over the network.

21. A network including a plurality of game machines, wherein each machine is linked to at least one other machine and only one of the machines is in turn connected to a controller.

22. A network according to claim 21 wherein each of the machines is connected to only two other machines with the exception of two machines one at each end of the network which are connected to only one machine.

23. A network according to claim 22 wherein the or each end of the network is terminated in a suitable impedance.

24. A network according to claims 21 to 23 wherein each machine receives all of the data being transmitted on the network.

25. A network according to claims 21 to 24 wherein one or more of the machines includes backup power supply means.

26. A network according to claim 25 wherein a network controller includes power management means for managing the power consumption of a machine connected to the network in the event that the machine is disconnected from mains power.

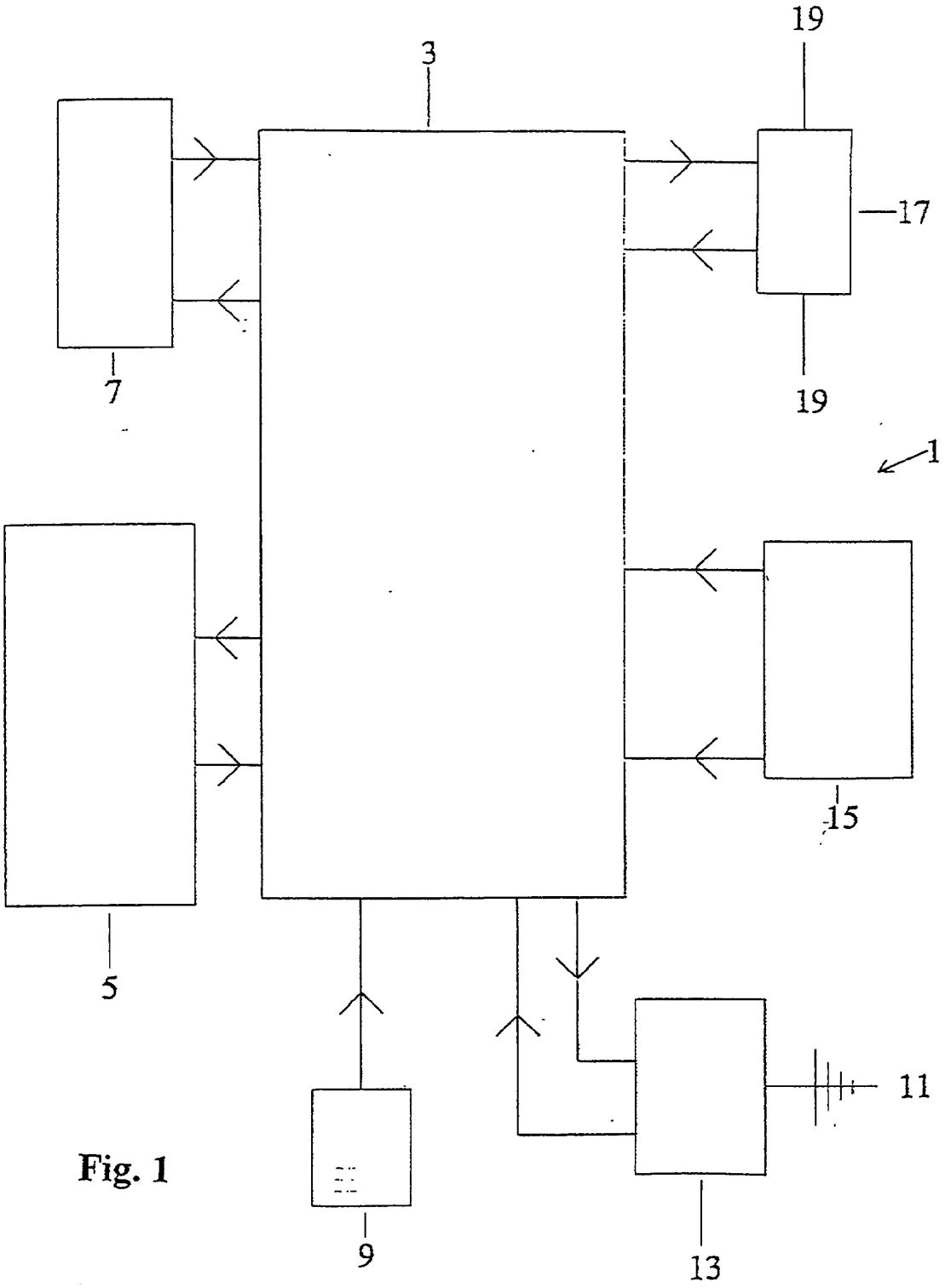


Fig. 1

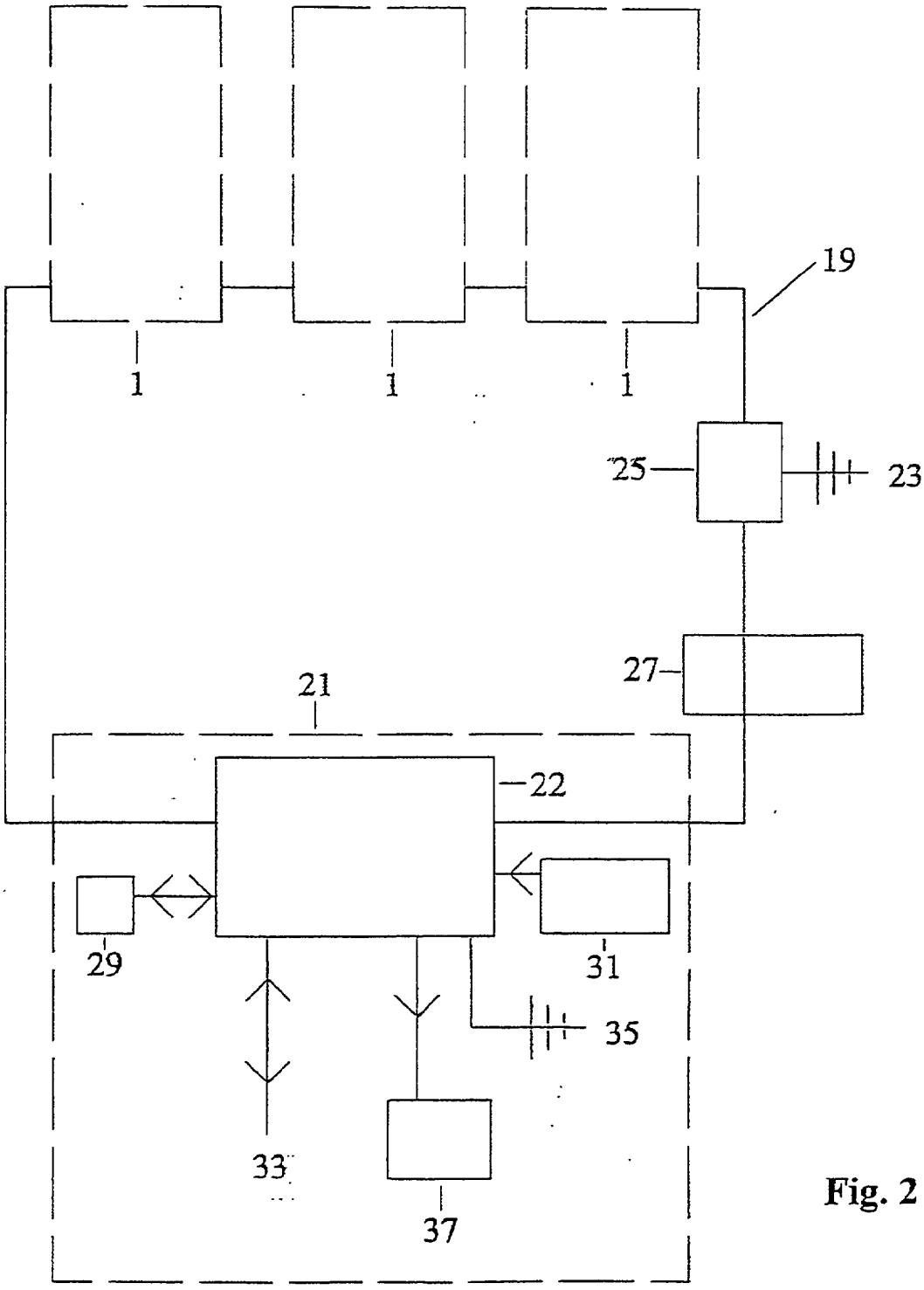
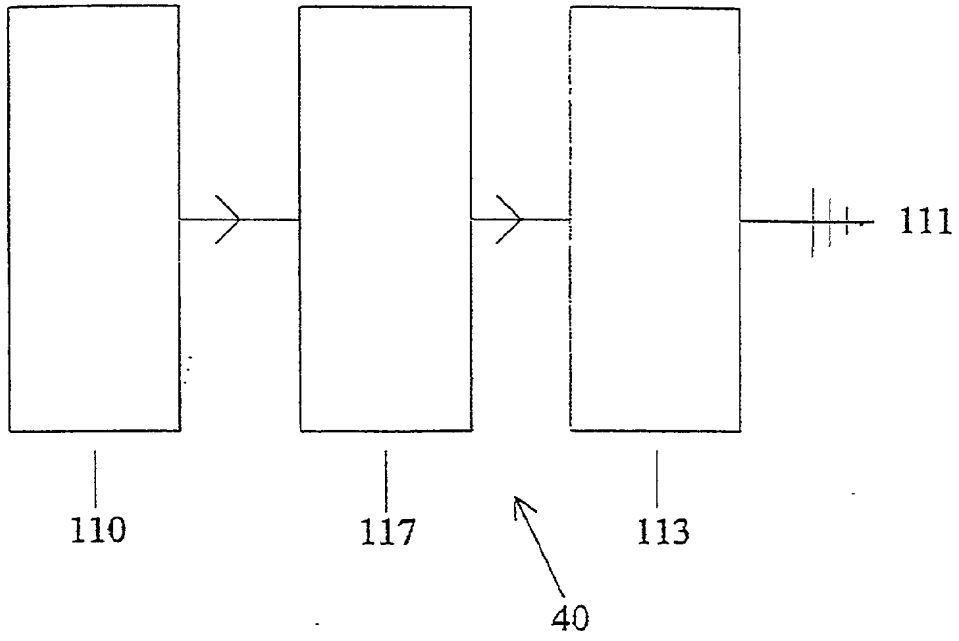


Fig. 2

Fig. 3



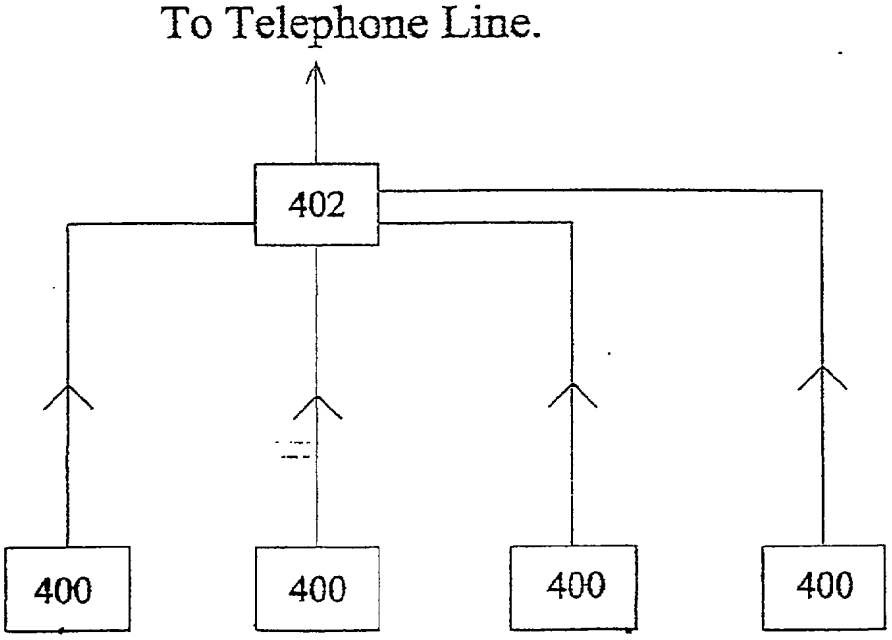


Fig. 4

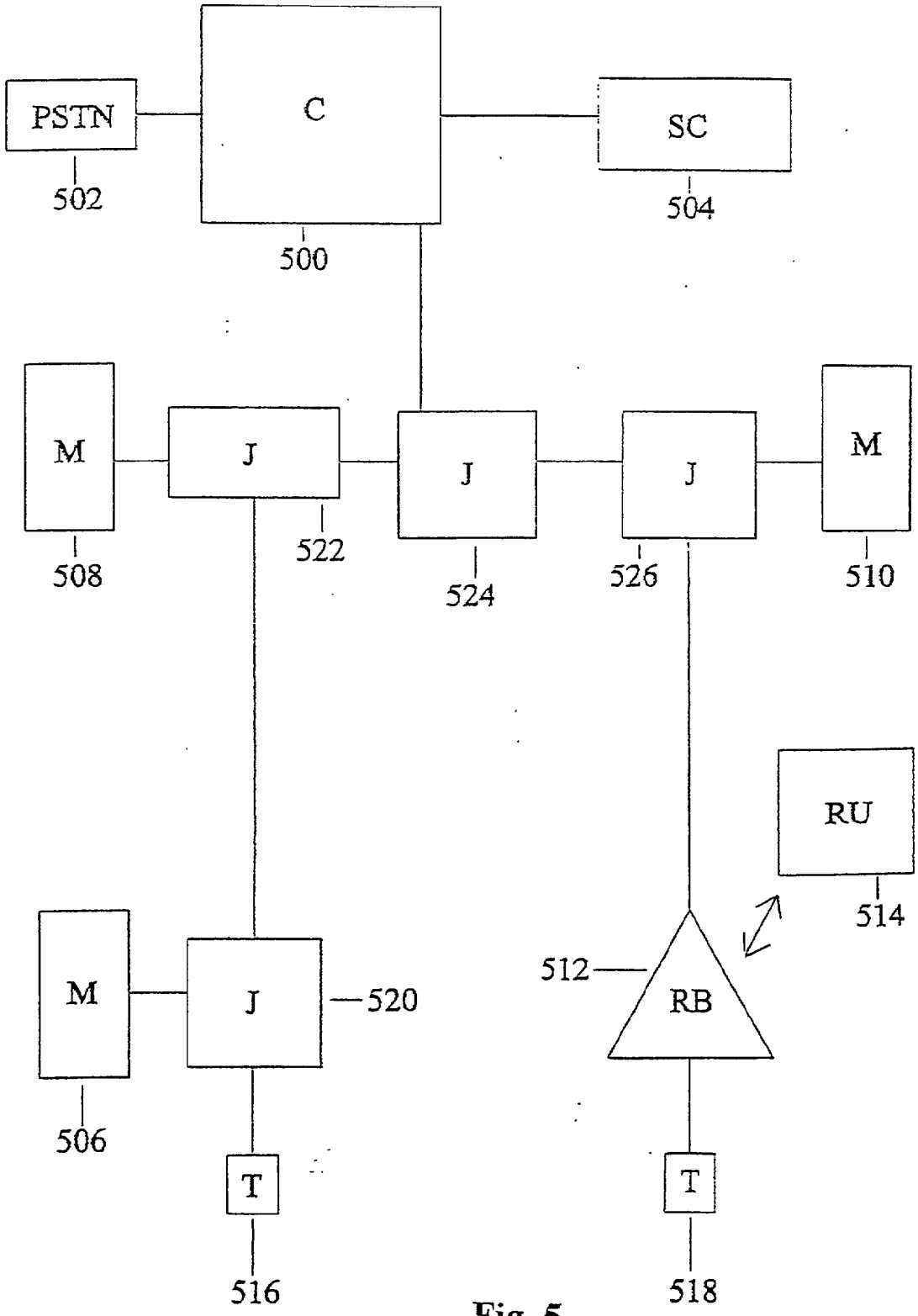

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Fig. 5